6. THE CLAIMS

It is claimed:

1. A method of processing a far-end signal and a near-end signal to produce a final signal, the far-end signal containing speech, the near-end signal containing speech and background noise, the method comprising:

a) determining an amplification gain based upon the near-end signal;

b) removing a portion of the background noise from the near-end signal to create a noise-reduced near-end signal;

c) combining the far-end signal with the noise-reduced near-end signal to create a combined signal; and

d) amplifying the combined signal by the amplification gain to create the final signal.

2. The method of claim 1, wherein the act of determining the amplification gain includes determining the masking level of the near-end signal.

3. The method of claim 1, wherein the act of determining the amplification gain includes determining the sound pressure level of the near-end signal.

4. The method of claim 1, wherein the act of determining the amplification gain includes determining the sound pressure level above the threshold of hearing audibility.

5. The method of claim 1, wherein the act of determining the amplification gain includes determining the amplification gain via the Fig 6. protocol.

6. The method of claim 1, wherein the act of determining the amplification gain includes determining the amplification gain via the NAL-NL1 protocol.

7. The method of claim 1, wherein the act of determining the amplification gain includes determining the amplification gain via the Independent Hearing Aid Fitting Forum protocol.

8. The method of claim 1, wherein the act of determining the amplification gain includes determining the amplification gain via the Desired Sensation Level input/output protocol.

9. The method of claim 1, wherein the act of determining the amplification gain includes determining the amplification gain via the Cambridge protocol.

10. The method of claim 1, wherein the act of removing a portion of the background noise from the near-end signal includes filtering the near-end signal with a high-pass filter.

11. The method of claim 1, wherein the act of removing a portion of the background noise from the near-end signal includes filtering the near-end signal with a high-pass

filter and suppression of the DC component of the near-end signal.

12. The method of claim 1, wherein the act of removing a portion of the background noise from the near-end signal includes removing a portion of the background noise via the spectral subtraction technique.

13. A method of processing a far-end signal and a near-end signal to produce a final signal, the far-end signal containing speech, the near-end signal containing speech and background noise, the method comprising:

a) separating the near-end signal into a first near-end subband signal and a second near-end subband signal;

b) determining a first amplification gain based upon the first near-end subband signal;

c) determining a second amplification gain based upon the second near-end subband signal;

d) removing a portion of the background noise from the near-end signal to create a noise-reduced near-end signal;

e) combining the far-end signal with the noise-reduced near-end signal to create a combined signal;

f) separating the combined signal into a first combined subband signal and a second combined subband signal;

g) amplifying the first combined subband signal by the first amplification gain to create a first amplified subband signal;

h) amplifying the second combined subband signal by the second amplification gain to create a second amplified subband signal; and

i) combining the first combined subband signal and the second combined subband signal to create the final signal.

14. The method of claim 13, wherein the act of determining the first amplification gain includes determining the masking level of the first near-end subband signal.

15. The method of claim 13, wherein the act of determining the first amplification gain includes determining the sound pressure level of the first near-end subband signal.

16. The method of claim 13, wherein the act of determining the first amplification gain includes determining the sound pressure level above the threshold of hearing audibility of the first near-end subband signal.

17. The method of claim 13, wherein the act of determining the first amplification gain includes determining the first amplification gain via the Fig 6. protocol.

18. The method of claim 13, wherein the act of determining the first amplification gain includes determining the first amplification via the NAL-NL1 protocol.

19. The method of claim 13, wherein the act of determining the first amplification gain includes determining the first amplification via the Independent Hearing Aid Fitting

Forum protocol.

20. The method of claim 13, wherein the act of determining the first amplification gain includes determining the first amplification via the Desired Sensation Level input/output protocol.

21. The method of claim 13, wherein the act of determining the first amplification gain includes determining the first amplification via the Cambridge protocol.

22. The method of claim 13, wherein the act of removing a portion of the background noise from the near-end signal includes filtering the near-end signal with a high-pass filter.

23. The method of claim 13, wherein the act of removing a portion of the background noise from the near-end signal includes filtering the near-end signal with a high-pass filter and suppression of the DC component of the near-end signal.

24. The method of claim 13, wherein the act of removing a portion of the background noise from the near-end signal includes removing a portion of the background noise via the spectral subtraction technique.

25. A method of processing a far-end signal and a near-end signal to produce a final signal, the far-end signal containing speech, the near-end signal containing speech and background noise, the method comprising:

a) separating the near-end signal into a first near-end subband signal and a second near-end subband signal;

b) determining the masking level of noise of the first near-end subband signal;

c) determining the masking level of noise of the second near-end subband signal;

d) estimating the masking level of noise of a third near-end subband signal based upon the masking level of noise of the first near-end subband signal and the masking level of noise of the second near-end subband signal;

e) determining a first amplification gain based upon the masking level of noise of the first near-end subband signal;

f) determining a second amplification gain based upon the masking level of noise of the second near-end subband signal;

g) determining a third amplification gain based upon the masking level of noise of the third near-end subband signal;

h) removing a portion of the background noise from the near-end signal to create a noise-reduced near-end signal;

i) combining the far-end signal with the noise-reduced near-end signal to create a combined signal;

j) separating the combined signal into a first combined subband signal, a second combined subband signal, and a third combined subband signal;

k) amplifying the first combined subband signal by the first amplification gain to create a first amplified subband signal;

l) amplifying the second combined subband signal by the first amplification gain to create a second amplified subband signal;

m) amplifying the third combined subband signal by the first amplification gain to create a third amplified subband signal; and

n) combining the first combined subband signal, the second combined subband signal, and the third combined subband signal to create the final signal.

26. A program storage device containing computer readable instructions that when executed by a digital signal processor perform the method of claim 1.

27. A program storage device containing computer readable instructions that when executed by a digital signal processor perform the method of claim 13.

28. A program storage device containing computer readable instructions that when executed by a digital signal processor perform the method of claim 25.

29. A telephone containing a digital signal processor and the program storage device of claim 26.

30. The telephone of claim 29 wherein the telephone is a cellular telephone.

31. A telephone containing a digital signal processor and the program storage device of claim 27.

32. The telephone of claim 31 wherein the telephone is a cellular telephone.

33. A telephone containing a digital signal processor and the program storage device of claim 27.

34. The telephone of claim 33 wherein the telephone is a cellular telephone.

35. A communication device comprising:

a) a transmitter/receiver adapted for a communication medium;

b) control circuitry coupled to the transmitter/receiver that controls transmission, reception and control of audio signals;

c) a speaker coupled to the control circuitry that renders audio signals audible; and

d) a microphone coupled to the control circuitry that transforms sounds into a sidetone signal;

wherein said control circuitry includes:

a noise filter that receives the sidetone signal and produces a noise-reduced sidetone signal; and

an amplifier that combines an audio signal received from the transmitter/receiver with the noise-reduced sidetone signal to produce a combined signal, amplifies the combined signal according to a function responsive to the background noise in the

sidetone, and provides an enhanced audio signal to the speaker.

36. The communication device of claim 35, wherein the control circuitry includes a digital signal processor.

37. The communication device of claim 35, wherein the noise filter includes instructions executed by the control circuitry.

38. The communication device of claim 35, wherein the noise filter executes a process to reduce background noise in the sidetone signal.

39. The communication device of claim 35, wherein the noise filter executes a process including determining a masking level of noise of the sidetone signal.

40. The communication device of claim 35, wherein the noise filter executes a process including determining a masking level of noise of a sidetone subband signal.

41. The communication device of claim 35, wherein the noise filter executes a process including estimating the masking level of noise of a sidetone subband signal.

42. The communication device of claim 35, wherein the amplifier includes instructions executed by the control circuitry.

43. The communication device of claim 35, wherein the amplifier executes a process including determining the spectral density of the background noise in the sidetone to produce parameters for multiband compression of the combined signal.

44. The communication device of claim 35, wherein the amplifier executes a process including separating the combined signal into a plurality of combined subband signals.

45. The communication device of claim 35, wherein the amplifier executes a process including separating the combined signal into a plurality of combined subband signals and amplifying the plurality of subband signals.

46. The communication device of claim 35, including a second microphone coupled to the amplifier that is used for estimating background noise.